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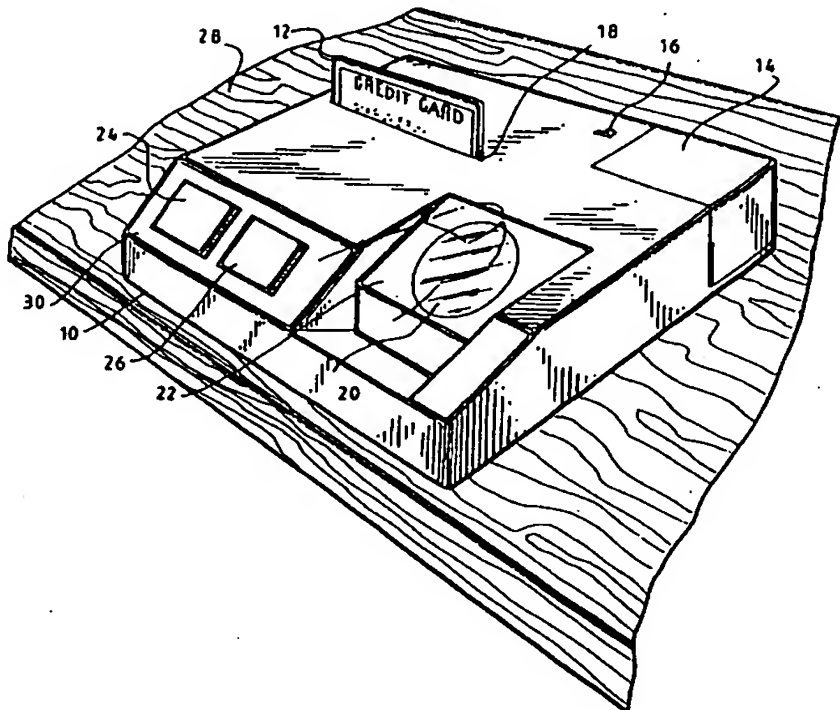
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(54) Title: CREDIT CARD WITH DIGITIZED FINGER PRINT AND READING APPARATUS

(57) Abstract

A credit card (12) having thereon an actual enhanced authorized card holders finger print (60) and corresponding digitized representation (88) of said actual finger print (60), an apparatus (10) to read said digitized finger print optically and magnetically and a method of reading said finger print optically and magnetically.



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DescriptionCredit Card With Digitized Finger
Print and Reading ApparatusTechnical Field:

This invention relates to an anti-fraud credit card, and more particularly to such a credit card that is of the utmost simplicity, ease of use and minimum cost, while at the same time being highly effective in preventing misuse of the credit card.

The present invention relates to the manufacture of credit cards and the security of such cards until release to the end user.

The present invention relates to an improved credit card construction which is digitized finger print for facilitating identification and discouraging counterfeiting.

This invention relates to an improved credit card construction and, more particularly, to a credit card construction which includes an encoding mechanism that eliminates unauthorized use of the credit card.

The present invention relates to the detection of specified patterns within a given area and, more particularly, to a system for automatically providing an indication of the position and orientation of specified minutia in a fingerprint.

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This invention relates to fingerprint comparison apparatus and, in particular, to a system using recycling FIFO buffer memories to perform parallel processing of a correlation algorithm to determine an "electronic" match between a portion of a reference fingerprint and a live fingerprint.

Description of the Prior Art:

Increasing security problems are becoming a noticeable part of modern life, security was once primarily the preserve of classified government installations, but increasing losses and calamities have forces the review of security equipment and procedures by government and industry. Cargo losses and the theft of corporate secrets cost industry billions of dollars annually. Unauthorized access to computer data bases and other files are a major concern today and in the future. Public safety is endangered by the ability of intruders to plant bombs in places such as aircraft and buildings. Computerized records and even the computers themselves, are attacked and destroyed.

Access control and personnel identification are becoming tremendous problems, and will be the object of significant expenditures by organizations needing to identify employees, vendors, etc., who are to be allowed access to plants, computer rooms, vaults, baggage areas, etc. The ultimate method of personal identification s

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not a card which can be lost, loaned or stolen, nor a number code which can be told or purloined, but an unchangeable, non-transferable and indisputably unique characteristic of the person himself, his fingerprint.

With crime in the United States and elsewhere on the upswing and with the relative supply of trained law enforcement personnel on the decline, the law enforcement community has been forced, in recent years, to investigate and consider the automatic processing of the large amounts of data it is required to maintain. One area of recent interest has been in the automatic processing of fingerprints. A few facts will serve to indicate why this is the case. The Federal Bureau of Investigation has a fingerprint file which consists of over 182,000,000 fingerprint cards, each having 10 prints thereon. There are some 13,000 agencies throughout the world contributing fingerprint cards to the FBI and the FBI receives over 27,500 inquiries per day. In its Washington offices alone, the FBI has over 1000 people whose task it is to search and classify fingerprint cards. The California Bureau of Criminal Identification and Investigation has a file consisting of approximately 5,500,000 fingerprint cards and receives in excess of 95,000 inquiries per month. The New York State Identification and Intelligence System has a file in excess of 1,300,000 fingerprint cards and receives more than 200,000 inquiries per year. These

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figures alone serve to indicate the enormity of the task of reading and classifying fingerprints for the purposes of identification and matching.

Other areas would benefit from a device for automatically reading fingerprints. For example, the economy of the United States today is based on the credit system and the use of credit cards. However, millions of dollars are lost annually because of the use of lost or stolen credit cards. With an automatic fingerprint reader and correlator, much of this could be eliminated. Each credit card could be made so that upon insertion into a machine, a central storage file would automatically locate the file of the credit card owner which would include his or her fingerprint records. Then, by merely placing the credit card holder's finger on a glass or the like, an automatic reader could read the fingerprint and provide the information to a correlation system which would determine whether the fingerprint of the credit card holder matches those in the file of the credit card owner. With automatic reading and correlating apparatus, this could be done in a matter of seconds.

Because of the importance of this problem, many suggestions have been made in recent years for automatic fingerprint readers and recorders. Many of the proposed systems operate to locate fingerprint minutiae, such as ridge endings or bifurcations, since the use of

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fingerprint minutiae as a means of positive, legal identification has been proven in practice. Therefore, since the automatic detection of specified minutiae is basically a problem in pattern recognition, it would appear to be a simple matter to provide an automatic system of the detection of such minutiae. However, the recognition of these minutiae is complicated by several factors, such as: (1) the specified minutiae occur at arbitrary orientations; (2) there are variations in ridge breadth and distance between ridge centers; (3) there are various inherent defects in all fingerprints, such as scars, warts, etc.; (4) false ridge endings appear at the boundaries of fingerprints and scars; and (5) the quality of fingerprints varies widely with respect to contrast and clarity. As a result, in almost all cases, the proposed system has either been too complex, too inefficient or inoperative.

For example, it has been proposed to use a large scale computer to control the scan of a fingerprint along some predetermined pattern and so store the resulting complex electrical signal. Subsequently, in order to identify a fingerprint, it will have to be scanned and the resultant complex electrical signal compared with those in the memory banks of the computer. Although this approach may well be operative, it has the inherent disadvantage of all mass data-processing

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systems, and that is the requirement for enormous amounts of complex and costly equipment.

Another suggested approach has been to use holographic techniques whereby two fingerprints may be matched or the location of specified minutiae on fingerprints identified by simultaneously illuminating an unknown fingerprint and a known mask with coherent laser light and determining the locations of a match. However, apparently because of the complexity and the minute detail present in typical fingerprints, it has not been possible to make such a system which operates reliably.

The American economy, over the years in the 20th Century, has slowly but surely changed into an economy centered on credit. As a business man travels from his banks to department stores to gas stations to restaurants, the credit card that is acceptable at each one of those institutions is different in most cases from the other cards that he must carry. As a business person travels throughout this country, from state to state, or throughout the world, from country to country, he or she is more and more burdened by the large number of various types and styles of credit cards that he must carry with him.

It is known to carry credit cards that are backed by large banking organizations. Cards such as a Visa or MasterCard are but two of the examples

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of this modern form of credit card. Although these cards are useful in a wide variety of situations, for example purchasing goods at a store or lodging at a hotel or inn, it is not uncommon for a single individual to have three or four of each of these types, each being issued by a different bank.

Another problem that may exist is when a card is first issued, a small figure, for example \$500 or \$600, is established as a line of credit. However, as time proceeds and the individual proves to be a good credit risk, that line of credit is expanded to an amount \$2,000 to \$5,000. It is very often difficult, when one person has four or five Visas or MasterCard, for that person to remember what credit limit applies to which card. More times than not, for a particularly large purchase, an individual might at first try to use a card that does not have sufficient credit on it, to the embarrassment of the card holder, even though he does have two or three other cards that do have sufficient credit on them.

Even though a person can get a bank credit card, this does not preclude the use of three or four cards from typically local establishments. While in the most part these establishments are department stores, and usually very large department stores at that, they are regional in their use. Therefore, a person traveling from the East Coast to the West Coast would find that he

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or she could no longer make purchases in a well-known department store on the West Coast because his credit reputation is known only to the East Coast department stores.

Plastic cards have gained great popularity in recent years as a medium by which purchase money is paid and business transacted without the necessity of carrying cash or enduring a long term escrow or other means for transferring title or securing payment of cash. With the popularity and ready acceptance of credit cards in the business world, the use thereof by unscrupulous persons to make unauthorized transaction has become a serious problem costing the consumers millions of dollars annually. As the demand for such cards has risen amongst counterfeiters and other illegal uses, the demand for improperly obtained cards market has skyrocketed thus creating an extremely high incentive for dishonest employees connected with the manufacture of such cards to succumb to temptation. Such employees are presented daily with a temptation to supply cards to persons bent on improper use thereof, all for great sums of money.

There have been many efforts in the past to assure the security of credit cards, including coding thereof for check at the point of purchase to determine if the card may be a stolen card. Other efforts have led to the construction of credit cards with a hologram strip secured to the face thereof and incorporating optical

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images characteristic of the particular card such that a merchant or other person to whom the card is presented will have an opportunity to examine the card to determine if the hologram is in position and to identify the characteristics of the images incorporated therein.

While many efforts have been made to provide security against illegitimate use of stolen credit cards, little effort has been made, and even less success achieved, to provide security at the place of manufacture and storage of such cards prior to distribution to the end user. Consequently, there exists a need for a method of manufacture and a credit card which discourages theft by employees yielding to the temptation to supply such cards to others or to use the cards themselves for illegitimate purposes.

By way of background, counterfeiting of credit cards at the present time is relatively easy and can be accomplished effectively by unsophisticated counterfeiters. In this respect, the ordinary credit card is fabricated from a 20 mil core layer of polyvinyl chloride which is printed to provide information on the front and rear of the card. Laminated to each of these layers is a 5 mil clear polyvinyl chloride sheet through which the printing can be seen. The total thickness of the card is 30 mils and it can be fabricated by the use of commercially available material. Thus, counterfeiters can obtain the basic materials for making a credit card

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from normal commercial channels, and with a minimum of equipment, may duplicate credit cards. It is with overcoming the foregoing ease of counterfeiting that the present invention is concerned.

Numerous innovations for preventing credit card fraud have been provided in the prior art that are adapted to be used, for example U.S. Pat. No. 3,050,711 to Harmon, U.S. Pat. No. 3,112,468 to Kamentsky, U.S. Pat. No. 3,234,513 to Brust, U.S. Pat. No. 3,293,604 to Klein, U.S. Pat. No. 3,370,271 to Van Dalen, U.S. Pat. No. 3,399,473 to Jaffe, U.S. Pat. No. 3,496,541 to Haxby, U.S. Pat. No. 3,611,290 to Luisi, U.S. Pat. No. 3,624,938 to Richard, U.S. Pat. No. 3,637,990 to Bayha et al., U.S. Pat. No. 3,699,519 to Campbell, U.S. Pat. No. 3,713,235 to Roberts, U.S. Pat. No. 3,731,085 to Bostrom, U.S. Pat. No. 3,762,081 to Armbruster et al., U.S. Pat. No. 3,787,839 to Fayling, U.S. Pat. No. 3,972,138 to Armbruster et al., U.S. Pat. No. 4,109,689 to Broune, U.S. Pat. No. 4,210,899 to Swonger et al., U.S. Pat. No. 4,223,918 to Smoczynski, U.S. Pat. No. 4,432,567 to Stockburger, U.S. Pat. No. 4,573,711 to Hyde, U.S. Pat. No. 4,593,936 to Opel, U.S. Pat. No. 5,054,090 to Knight et al., U.S. Pat. No. 5,255,941 to Solomon. Even though these innovations may be suitable for the specific individual purposes to which they address, they would not be suitable for the purposes of the present invention as heretofore described.

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Disclosure of the Invention:

An antifraud credit card or identification card embodying the invention comprises a card member having digitized finger print and bearing information that is presentable to a person seeking to consummate a transaction. The credit card further has a legitimate message that allows consummation of the transaction and a plurality of illegitimate messages that deny such consummation.

The instant invention is a universal credit card. It is of the usual plastic and mylar composition and typical dimensions that ordinary credit cards are of but has on both surfaces a protective, very thin, transparent covering to protect the digitized and actual finger print information stored underneath. The information stored underneath the covering is divided into categories: photographic information; information digitized finger print on a magnetic tape; printed information; written information; digitized finger print embossed or raised-figure information. On the front side of the credit card, identifying information is located: a line of identifying digitized finger print numbers and letters representing the cardholder's digitized finger print with a plurality of spaced apart arrays that allows the inscription of numerous other digits; and the expiration date of the card. On the back side of the credit card may be a strip of magnetic tape with

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digitized finger print therein. The credit card holder's signature in ink is on the back side of the card on a piece of specially prepared material.

It is therefore an object of the present invention to provide a universal digitized finger print credit card for use by individuals who already have an established credit reputation.

It is an object of this invention to cross reference the actual fingerprint with the digitized fingerprint on the credit card, transmit the digitized fingerprint to a centralized computer where a cross reference of the computer files is conducted. The primary object is to permit, in some cases, a cross check between the digitized fingerprint on the card and the actual fingerprint. In other cases, a three way among the digitized fingerprint on the credit card, the actual fingerprint of the user and the centralized computer which will contain a digitized fingerprint of the card holder. This centralized computer could also contain the credit record to be used.

It is a further object of the present invention to provide a universal digitized finger print credit card that has a current digitized and actual finger print photograph and identifying code having digitized finger print next to the name of the individual.

It is a still further object of the invention to provide a universal digitized finger print credit card

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that will carry in magnetically coded information such as digitized and actual finger print providing additional security to the credit card holder.

It is a still further object of the invention to provide a method for using the universal digitized finger print type credit card.

The method of the present invention is characterized by manufacturing credit cards with a warning printed on the face thereof in such a manner that it will be discernable to a merchant or other individual to whom the card is presented for being honored in carrying out a transaction. A cover is constructed of a strip of material having a characteristic digitized finger print that absence of such correct information will present a warning to the merchant.

It is one important object of the present invention to code a credit card in such a manner that counterfeiting thereof is made difficult.

It is another object of the present invention to provide an improved digitized finger print credit card which can reveal the area of its issuance by visual inspection, thereby alerting a merchant to the fact that such credit card may not have issued in his particular geographical area.

The present invention relates to a digitized finger print credit card laminate comprising a plurality of layers of material of different of visible thickness

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laminated relative to each other and extending to the edge of said card to thereby provide a digitized finger print pattern at the edge of said card. The present invention also relates to a digitized finger print credit card laminate comprising a plurality of layers of material laminated to each other including a layer of material containing metal and/or optical features to provide a predetermined conductivity which can be sensed by suitable detecting apparatus.

The present invention contemplates utilization of a standard credit card format, with embossed information on the face of the card and, optionally, a magnetic tape attached to the card.

It is thus an object of the present invention to provide an improved credit card encoding digitized and actual finger print.

It is a further object of the present invention to provide a credit card encoding digitized and actual finger print incorporating features of many presently available credit cards and also providing the additional feature of a encoding digitized and actual finger print that prevents unauthorized use of the credit card.

It is another object of the present invention to provide a credit card encoding having digitized finger print serving to identify the correct user of the credit card.

Still another object of the present invention is to

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provide a credit card encoding having a magnetic strip to represent digitized finger print providing an identification means for the authorized user and of the credit card.

An object of this invention is to provide a device as aforesaid embodying means whereby the possibility of use being used by unauthorized persons is minimized.

It is an object of this invention to provide a fingerprint-based access control system which can read a human fingerprint directly from a human finger.

It is an additional object of this invention to provide a system for providing a limited access to areas by individuals by identifying them through their fingerprints.

It is a further object of this invention to record time-keeping and payroll data as well as to log personnel entry/exit to specific areas.

It is an additional object of this invention to provide a positive identification system for banking and credit card transactions.

It is an additional object of this invention to extract and use the unique personal characteristics of fingerprints which are derived and used by law enforcement agencies to that data on individuals attempting an unauthorized access can be forwarded to the agencies for action.

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It is a still further object of this invention to provide a fingerprint-based access control system which is readily digitized finger print to cover changes in personnel.

It is a further object of the present invention to provide a novel fingerprint minutiae reading device.

It is still another object of the present invention to provide a system for detecting the position and orientation of specified minutiae in a fingerprint.

Accordingly, it is a primary object of the present invention to provide a low cost, dedicated, hardware implemented correlation system for fingerprint identification.

It is a further object of the invention to restrict the scanned portion of the total fingerprint area to avoid problems with skin distortion and skew.

It is an additional objective of this invention to provide a fingerprint bases access control system for computer data bases and other computer files that presently require a password.

It is also an objective of this invention to provide additional unique identification features to drivers licenses, alien identification cards and a universal health card, college identification (meal card), etc.

According to the present invention, there is provided a system for automatically providing an indication of the position and angular orientation of

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specified minutiae in a fingerprint. The proposed system is fundamentally very simple and can be implemented with existing off-the-shelf, commercial, electronic components. The present system can be used to detect any type of minutiae such as ridge endings and/or bifurcations, as required. The system will detect as many specified minutiae as possible with a minimum number of false alarms.

Briefly, the present fingerprint minutiae reading device operates by sequentially observing small portions of a fingerprint, with the use of a flying spot scanner, to derive, at each position, an electrical analog signal indicative of the pattern at the position. The analog signal, so derived is converted into digital form and temporarily stored in a small memory having a plurality of storage elements. The signal in the memory is constantly circulated through each of the storage elements to aid in the recognition of minutiae regardless of their angular orientation. Finally, the occurrence of specified minutiae is detected by sensing the states of selected ones of the storage elements. An automatic contract control circuit adjusts the detection process as a function of the local quality of the fingerprint image to increase the probability of detection of minutiae in prints of relatively poor quality. The system includes apparatus to inhibit the recognition of false ridge endings in broken ridges, the

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terminations of ridges at the print boundaries, or the termination of ridges produced by scars, and, if it becomes desirable to recognize the existence of scars, etc., the ridge endings produced by scars may be detected and recorded for later processing.

It is therefore an object of the present invention to provide a system for detecting specified patterns.

It is a further object of the present invention to provide a novel fingerprint minutiae reading device.

It is still another object of the present invention to provide a system for detecting the position and orientation of specified minutiae in a fingerprint.

It is another object of the present invention to provide a fingerprint minutiae reading device in which a digitized image of the fingerprint is stored in a temporary memory and in which the image in the memory is circulated to assist in the detection of minutiae having arbitrary angular orientations.

It is still another object of the present invention to provide a fingerprint minutiae reading device which includes an automatic contrast control circuit to permit adaptation to the local quality of a fingerprint image.

Still another object of the present invention is the provision of a fingerprint minutiae reading device which may be implemented with existing off-the-shelf, commercial, electronic components.

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Brief Description of the Drawing Figures:

FIGURE 1 is a perspective view of a credit card finger print reading apparatus on top of a table exhibiting a credit card containing therein an actual and/or digitized finger print of an authorized credit card holder being scanned by the apparatus whereas the credit card is inserted in the credit card insertion slot. The apparatus further exhibiting an access door housing auxiliary power means and a power on/off switch. The card holder places his/her finger on the fingerprint scanning screen located on the angled front face and the fingerprint is scanned by the finger print scanner. If the finger print scanned by the finger print scanner and the finger print scanned on the credit card do not match then the red indicator light illuminates alerting the user that a fraudulent transaction is about to take place. If the green indicating light illuminates, then the user is alerted that the card and card holder are valid.

FIGURE 2 is an enlarged perspective view of the auxiliary power source exhibiting the power on/off switch, as well as other internally located features which become apparent when the access door is removed revealing a battery terminal clamp, electric terminals and recharging unit having a male plug which integratedly fits into the female plug located on the credit card finger print scanning apparatus.

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FIGURE 3 is a side view of the credit card finger print scanning apparatus exhibiting externally located features such as the green indicator light, angled front face which the finger print scanner door is openable by a hinge, credit card, access door, as well as internally located features such as the magnetic credit card scanner having a complimentary digitized credit card finger print scanner, a finger print scanning screen with a finger print scanner with a finger print alignment tool located underneath having an optical reader comprising a scanner therein positioned on a mounting bracket.

FIGURE 4 is a perspective cross sectional view exhibiting externally located features such as the angled front face which the finger print scanner door openable by a hinge, access door, as well as internally located features such as the magnetic credit card scanner having a complimentary digitized credit card finger print scanner, a finger print scanning screen with a finger print scanner with a finger print alignment tool located underneath having an optical reader comprising a scanner therein positioned on a mounting bracket.

FIGURE 5 is an enlarged top view of a finger print comprising a finger print top, ridges, finger print center, finger print sides, bumps, valleys, plateaus, divots, finger print bottom, sequential bumps and a

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finger print alignment spot thereby the optical scanning device self aligns.

FIGURE 6 is a back view of a credit card having a magnetic tape, signature, digitized finger print, reduced enhanced finger print image, and credit card number on back.

FIGURE 7 is a front view of a credit card having a name of credit card, type of credit card, credit card number on front, first issue date, credit ID, expiration date, and name of credit card holder.

Detailed Description of the Preferred Embodiments:

Referring now to Figure 1 which is a perspective view of a credit card finger print reading apparatus 10 on top of a table 28 exhibiting a credit card 12 containing therein an actual and/or digitized finger print of an authorized credit card holder being scanned by the apparatus 10 whereas the credit card is inserted in the credit card insertion slot 18. The apparatus 10 further exhibiting an access door 14 housing auxiliary power means 32 and a power on/off switch 16. The card holder places his/her finger on the fingerprint scanning screen 20 located on the angled front face 30 and the fingerprint is scanned by the finger print scanner 22. If the finger print scanned by the finger print scanner 22 and the finger print scanned on the credit card do not match then the red indicator light 24 illuminates

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alerting the user that a fraudulent transaction is about to take place. If the green indicating light 26 illuminates, then the user is alerted that the card and card holder are valid.

Referring now to Figure 2 which is an enlarged perspective view of the auxiliary power source 32 exhibiting the power on/off switch 16, as well as other internally located features which become apparent when the access door 14 is removed revealing a battery terminal clamp 34, electric terminals 36 and recharging unit 40 having a male plug 38 which integratedly fits into the female plug 42 located on the credit card finger print scanning apparatus 10.

Referring now to Figure 3 which is a side view of the credit card finger print scanning apparatus 10 exhibiting externally located features such as the green indicator light 26, angled front face 30 which the finger print scanner door 44 is openable by a hinge 46 revealing finger print scanner 50 mounted on a bracket 56, credit card 12, access door 14, as well as internally located features such as the magnetic credit card scanner and complimentary digitized credit card finger print reader 48, a finger print scanning screen 20 with belt 52, finger print line sensor 58 located underneath.

Referring now to Figure 4 which is a perspective cross sectional view exhibiting externally located

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features such as the angled front face 30 which the finger print scanner door 44 openable by a hinge 46, access door 14, as well as internally located features such as the magnetic credit card reader 48 described above, a finger print scanning screen 20 with a finger print scanner 50 with a scanning bar 58 located underneath having an optical reader 54 belt 52 and pulleys 54.

Referring now to figure 5 which is an enlarged top view of a finger print 60 comprising a finger print top 62, ridges 64, finger print center 66, finger print sides 68, bumps 70, valleys 72, plateaus 74, divots 76, finger print bottom 78, sequential bumps 80 and a finger print alignment spot 82 thereby the optical scanner 52 device self aligns. During the optical scanning of the fingerprint 60 by the optical scanner 52, the finger print is digitized by the optical scanner 52 translating physical features of the finger print into a digitized form using binary numbers such as 0 and 1. Thus, for example when the optical scanner 52 reads the following set of finger print 60 physical features such as; (1) bump 70, (2) valleys 72, (2) plateaus 74, (3) divots 76, 910 sequential bumps 80, and (4) ridges 64, a digitized representation may read such as 1 00 1111 000000 1111 11111111, hence, (1) bump 70 represents (1) 1 digit, (2) valleys 72 represents (2) 0 digits, (2) plateaus 74 represents (4) 1 digits, (3) divots 76 represents (6) 0

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digits, (1) sequential bump 80 represents (4) 1 digits, and (4) ridges 64 represents (8) 1 digits, respectively.

It is obvious to one skilled in the art of optical scanning and computer digitization that the physical features of the fingerprint 60 may be assigned any binary or other code to represent said features.

Referring now to Figure 6 which is a back view of a credit card having a magnetic tape 84, signature 86, digitized finger print 88, reduced enhanced finger print image 90, and credit card number on back 92.

Referring lastly to Figure 7 which is a front view of a credit card having a name of credit card 94, type of credit card 96, credit card number on front 98, first issue date 100, credit card ID 102, expiration date 104, and name of credit card holder 106.

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CLAIMS

1. A digitized finger print credit card verification system comprising, in combination:

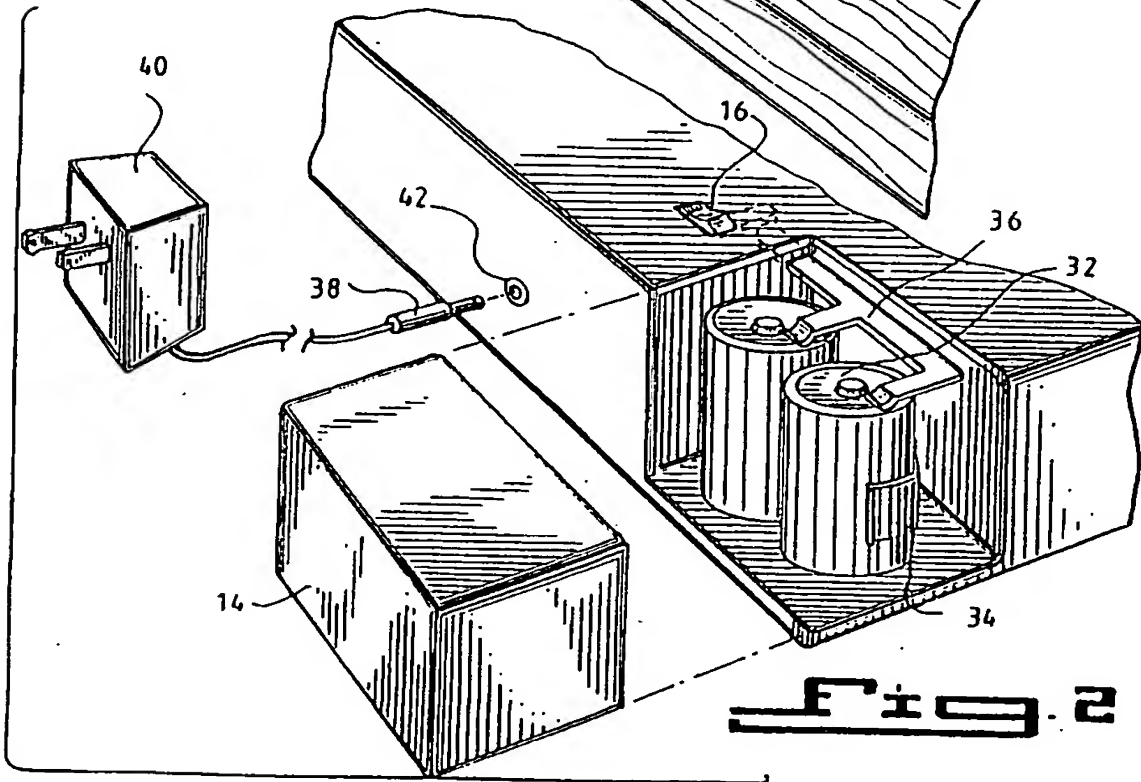
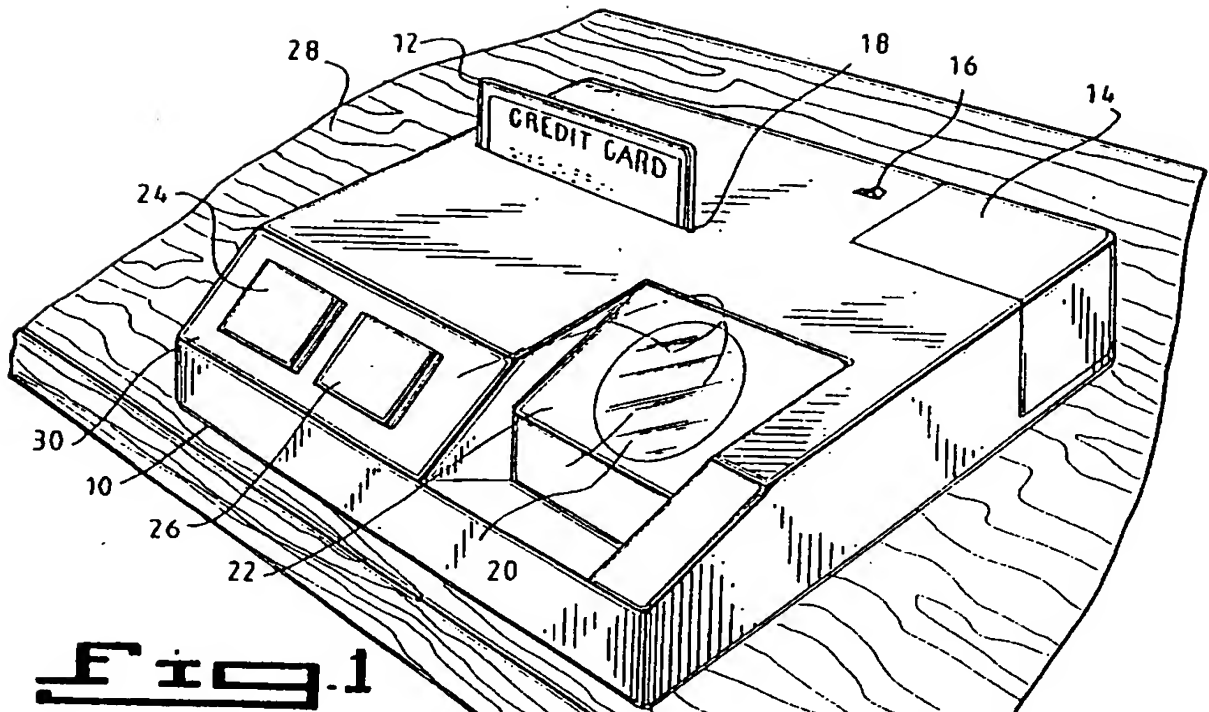
a. a credit card having mounted therein a credit card identification number, validation dates, member establishment dates, name of credit card, a representation in binary numerical form of a digitized finger print representing an original card holder's actual finger print, a representation of said actual finger print, a magnetic strip having magnetically thereon a digitized form of said original card holder's finger print, an original card holder's signature space, and an original card holder's name;

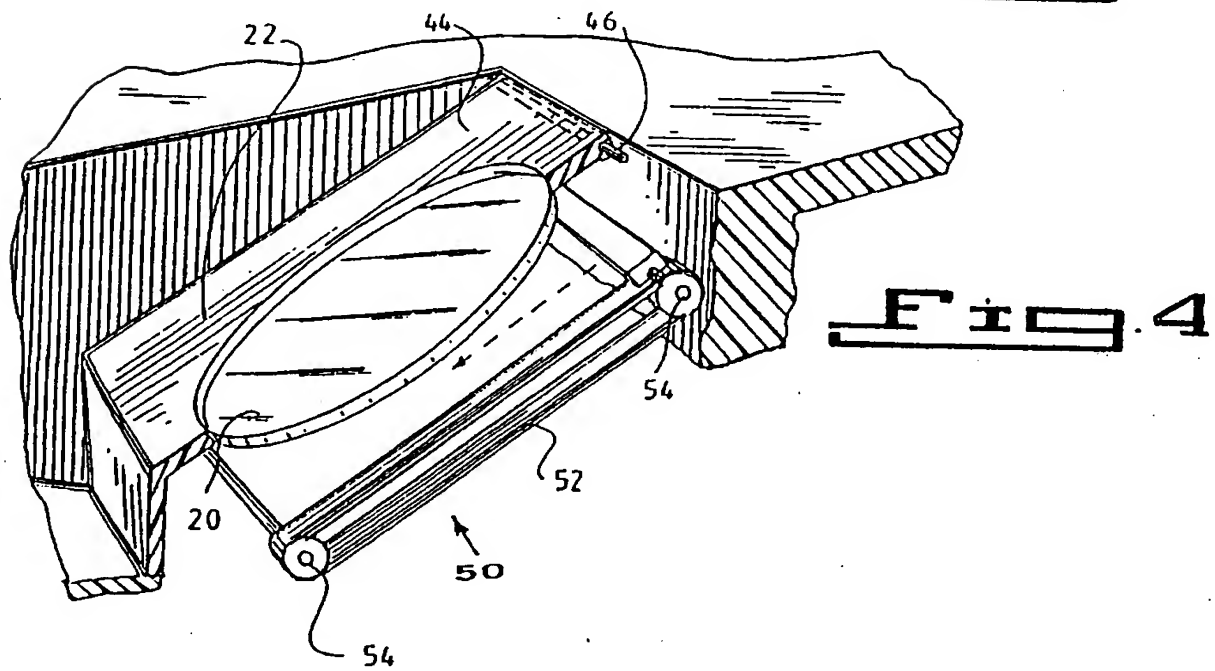
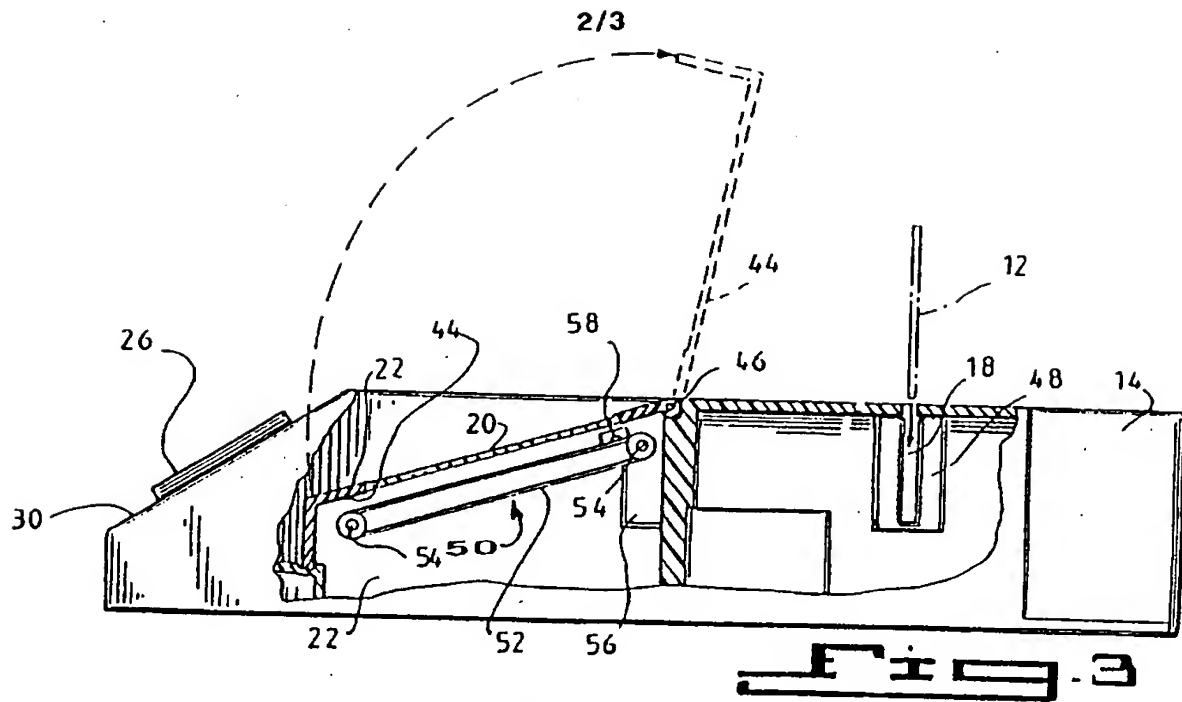
b. digitized finger print credit card reading apparatus comprising at least one access door, an on/off switch, a credit card insertion slot having a digitized finger print reader and a magnetic credit card scanner, a finger print scanning screen, a finger print scanner including a line sensor, a plurality of indicator lights to indicate whether there is a finger print match, an angled front face thereon containing said finger print scanning screen and therein containing said finger print scanner, a hingeably mounted finger print scanning door, and an auxiliary power source having at least one battery clamp, electric terminals, and a male plug located at a terminus with a corresponding female plug

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located on said digitized finger print credit card
reading apparatus.

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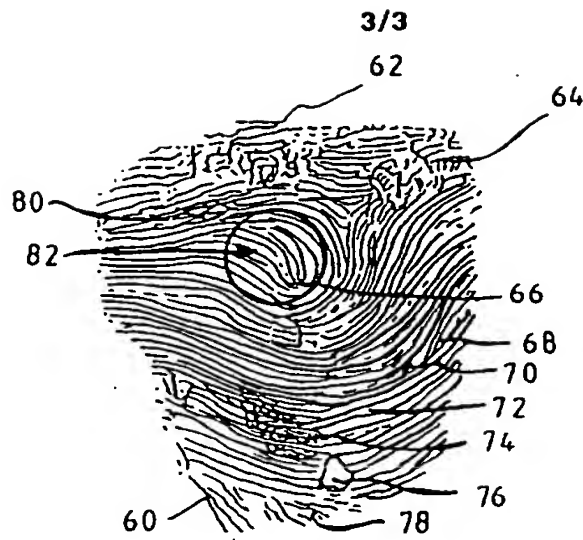


Fig. 5

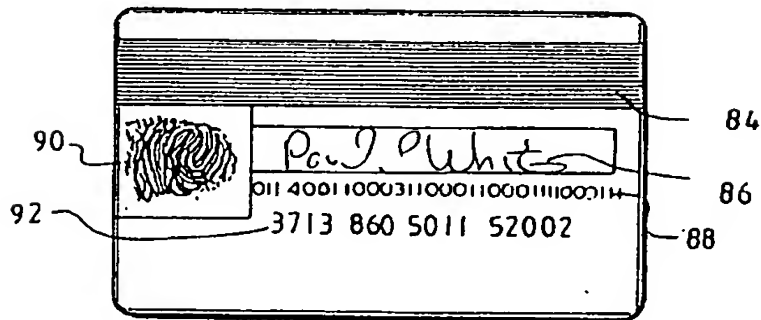


Fig. 6

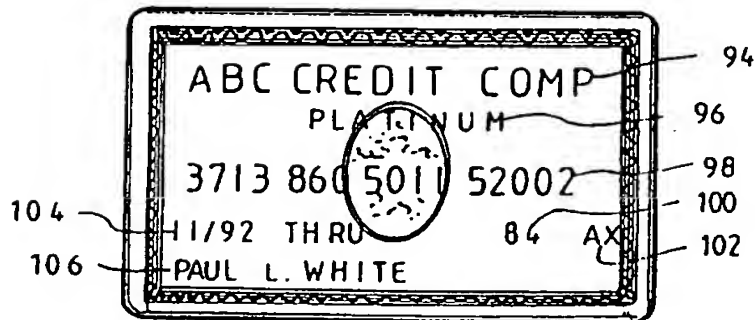


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/15703

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G06K 9/00
US CL : 382/116, 124

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 382/116, 124

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

APS

search terms: (fingerprint# or finger print#), (card# or card?), magnetic strip#, signature#, date#, valida?

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4,995,086 (LILLEY ET AL) 19 FEBRUARY 1991, Figures 1-3, col. 3, lines 10-39.	1
A	US, A, 4,707,592 (WARE) 17 NOVEMBER 1987, Figures 2A-2C, Figure 4A.	1
A	US, A, 4,599,509 (SILVERMAN ET AL) 08 JULY 1986, Figures 1 and 2.	1



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
A document defining the general state of the art which is not considered to be part of particular relevance	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
E earlier document published on or after the international filing date	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
L document which may throw doubt on priority claim(s) or which is cited to establish the publication date of another citation in other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

04 MARCH 1996

Date of mailing of the international search report

19 MAR 1996

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